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JYOTI NIVAS COLLEGE AUTONOMOUS

DEPARTMENT OF MCA

Tech-on-Tap

A monthly E-Journal by the students of MCA department. Tech-on-Tap facilitate students to enrich and be update to market standards. Aware of research trends and be adaptive to technology change.

RESEARCH TRENDS IN CURRNT ERA

The September E-Journal Title Research Trends in Current Era focuses on the advanced research topic widely used in solving issues that exist in real time. The five articles included in this e-journal are part of assignment submitted by the students of II MCA.

ARTIFICIAL INTELLIGENCE AND ROBOTICS
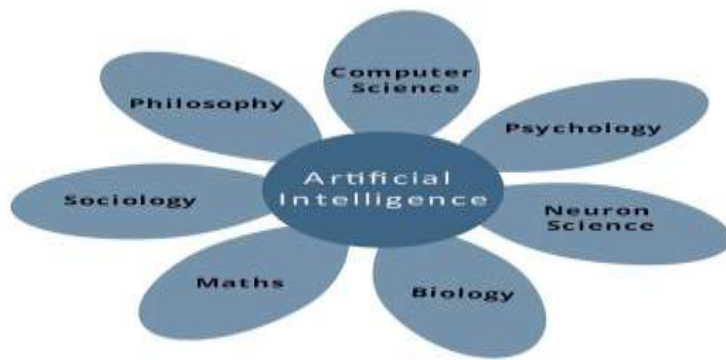

ARTIFICIAL INTELLIGENCE AND ROBOTICS   ABILASHA D – II MCA

Artificial Intelligence and Robotics have a common root and a relatively long history of interaction and scientific discussion. The birth of Artificial Intelligence and Robotics takes place in the same period and initially there was no clear distinction between the two disciplines.

Artificial Intelligence is a general term that implies the use of a computer to model and to replicate intelligent behaviour, they are a powerful combination for automating tasks inside and outside of the factory setting. In recent years, Artificial Intelligence has become an increasingly common presence in robotic solutions, introducing flexibility and learning capabilities in previously rigid applications. While AI is still in its nascent stages, it's been a transformative technology for some applications that have yet to fell the impact

Research in AI focuses on the development and analysis of algorithms that learn and perform intelligent behavior with minimal human intervention. These techniques have been and continue to be applied to a broad range of problems that arise in robotics, e-commerce, medical diagnosis, gaming, mathematics and military planning and logistics.

Four Robotic Applications that use Artificial Intelligence

1. **Assembly**
   AI is a highly useful tool in robotic assembly applications. When combined with vision systems, AI can help with real-time course correction, which is particularly useful in complex manufacturing sectors like aerospace. AI can also be used to help a robot learn on its own which paths are best for certain processes while it's in operation.

2. **Packaging**
   Robotic packaging uses forms of AI frequently for quicker, lower cost and more accurate packaging. AI helps save certain motions a robotic system makes, while constantly refining them, which makes installing and moving robotic systems easy enough for anybody to do.

3. **Customer Service**
   Robots are now being used in a customer service capacity in retail stores and hotels around the world. Most of these robots leverage AI natural language processing abilities to interact with customers in a more human way, Often, the more these systems can interact with humans, the more they learn.

4. **Open Source Robotics**
   A handful of robotic systems are now being sold as open source systems with AI capability. This way, users can teach their robots to do custom tasks based on their specific application, such as small scale agriculture. The convergence of open source robotics and AI could be a huge trend in the future of AI robots.

   AI gives robots a computer vision to navigate, sense and calculate their reaction accordingly. Robots learn to perform their tasks from humans through machine learning which again a part of computer programming and AI.

   Since the time John McCarthy has coined the term Artificial intelligence in 1956, it has created a lot of sensation. This is because AI has the power to give life to robots and empower them to take their decisions on their own. Depending on the use and the tasks that the robot has to perform different types of AI is used.

   Therefore nowadays, robots are becoming smarter and more efficient with the help of computer science. So, Artificial Intelligence has played a very major role not only in increasing the comforts of humans but also by increasing industrial productivity which includes the quantities as well as qualitative production and cost-efficiency.

THE BLOCKCHAIN TECHNOLOGY
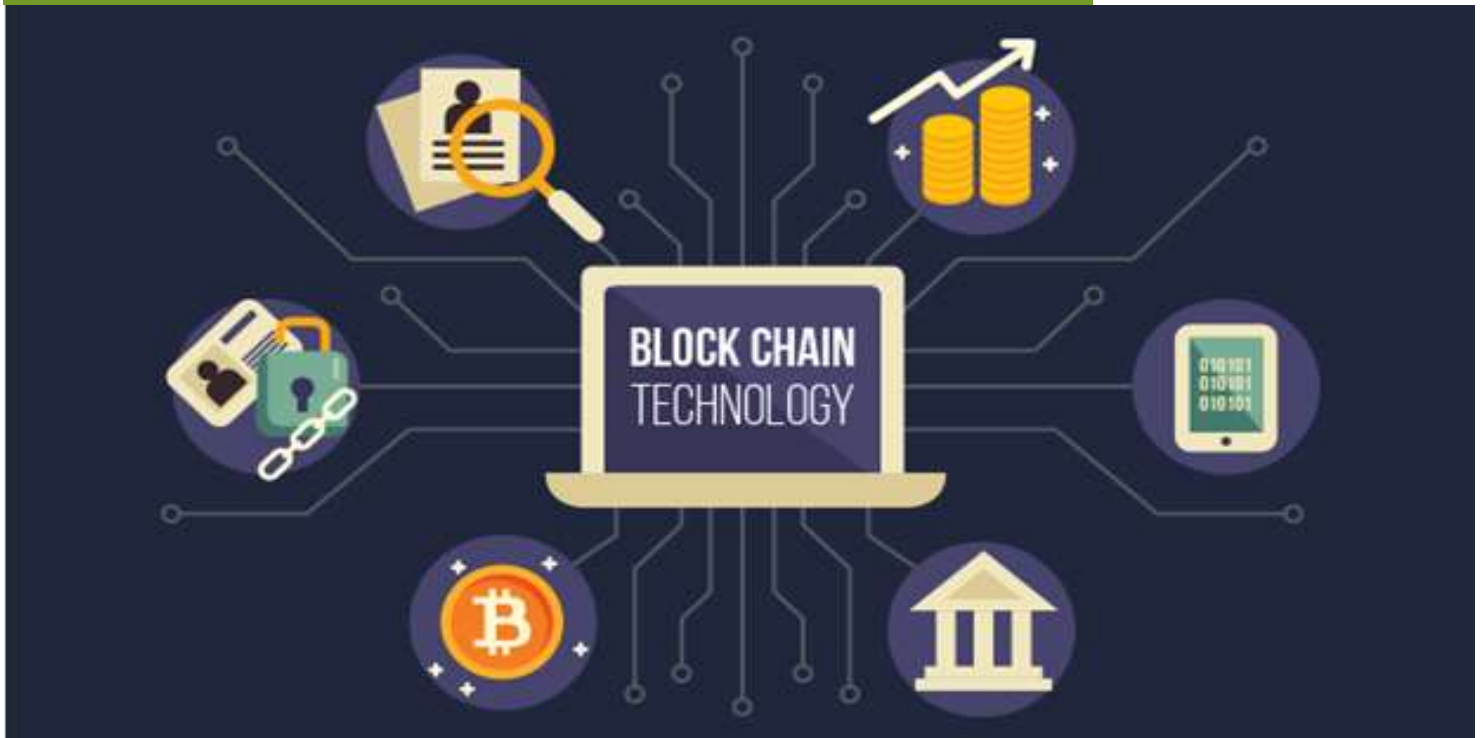
THE BLOCKCHAIN TECHNOLOGY   **DEEPIKA – II MCA**

The Blockchain is an undeniably ingenious invention – the brainchild of a person or group of people known by the pseudonym, Satoshi Nakamoto. By allowing digital information to be distributed but not copied, blockchain technology created the backbone of a new type of internet. Originally devised for the digital currency**,** Bitcoin blockchain**, (**Buy Bitcoin) the tech community has now found other potential uses for the technology.

Blocks store information about transactions like the date, time, and dollar amount of your most recent purchase like from Amazon. Blocks store information about who is participating in transactions. A block for your splurge purchase from Amazon would record your name along with Amazon.com. Instead of using your actual name, your purchase is recorded without any identifying information using a unique "digital signature," sort of like a username. Blocks store information that distinguishes them from other blocks. Much like you and I have names to distinguish us from one another, each block stores a unique code called a "hash" that allows us to tell it apart from every other block. Hashes are cryptographic codes created by special algorithms. Let's say you made your splurge purchase on Amazon, but while it's in transit, you decide you just can't resist and need a second one. Even though the details of your new transaction would look nearly identical to your earlier purchase, we can still tell the blocks apart because of their unique codes. Although the design is simple, it is this design that makes Blockchain invulnerable to data tampering. Blockchain technology is an open distributed ledger that can record transactions of two parties securely and efficiently. As it is

distributed, Blockchain is typically managed by a peer-to-peer network working simultaneously together to solve complex mathematical problems in order to validate new blocks. Once recorded, the data in any given block cannot be updated retroactively without changing all subsequent blocks, which requires the confirmation of the majority in the network. This is the main reason why blockchain technology is secure and not susceptible to hacking.

Blockchain technology is simple to understand at its roots. Basically, the tech exists as a shared database filled with entries that must be confirmed by peer to peer networks and encrypted. It's helpful to envision it as a strongly encrypted and verified shared google document, in which each entry in the sheet depends on a logical relationship to all its predecessors, and is agreed upon by everyone in the network. but blockchain technology has many more potential use cases beyond other than just serving as the fuel behind bitcoin. Below, there are outlined some of its emerging applications across finance, business, government, and other industries.

People often think that all their information and transaction details posted on to the blockchain are public, based on the fact that the distributed ledger is public. This is not correct.

Though visibility depends on different use cases and the technology deployed. Narrowing the scope to this question – for business to business purposes, all transactions are private and only visible with the appropriate permissions. A company leveraging a blockchain to distribute data to their suppliers does not mean his competitors can see his suppliers or what they are buying. Nor can the suppliers see other suppliers' data. It is all private and secure and the suppliers only see the data the buyer has permissioned them to see.

Whilst some transactional information can be made public, what is stored on the distributed ledger is nothing more than the amount of the transaction and a hash. The hash is a code generated by running the actual transaction details through a cryptographic method. Therefore, it is impossible to have access to more information on the transaction.

Limitations and vulnerability

Any Blockchain network largely depends on the amount of active users within it. In order to operate to its full potential, a network has to be a robust one with a widely distributed grid of nodes. Moreover, there is no Blockchain network in existence that could sustain the same amount of transactions as major card issuers like Visa or MasterCard do. As of 2017, Blockchain still has a very long way to go before it will be capable of replacing the giants of the financial world. Finally, there is always a theoretical possibility of a large-scale capture of any given Blockchain network. If a single organization will somehow manage to gain control of the majority of the network's nodes, it will no longer be decentralized in the full sense of the word.

COMPUTER VISION

COMPUTER VISION   **PRIYANKA S – II MCA**

Computer vision also abbreviated as CV, is a field which is used to see and understand the given image like any human on earth. They want computers to be as sensitive as human's eyes and think and process the image the way human's brain process it. This has been the key goal of computer vision from many years and many are working on this.

"The goal of computer vision is to extract useful information from images. This has proved a surprisingly challenging task; it has occupied thousands of intelligent and creative minds over the last four decades, and despite this we are still far from being able to build a general-purpose "seeing machine."

Computer vision is a subfield of Artificial Intelligence, Machine Learning and Neural Networks. All these fields used together people are trying to get progress in field of computer vision but still no algorithms are built that could do the exact work of brain because, still it is not properly proved by research how brain is able to recognise the image and identify it. More research is being done to find out. One of facts for CV to gain more importance now is the growth of data and to analyse those data quickly CV will play a major role.

It all started in 1960s by Larry Roberts at MIT. The aim was to extract 3D information from 2D view. Later in around David Marr proposed framework by applying low level image processing on 2D image and extracting 2.5 D sketch. From then till now many researches are made and they have successfully achieved progress in few fields like fingerprint recognition and biometric, surveillance, motion capture and many more.

The way CV works is by pattern recognition. After giving input about the item thousand times the computer will be able to recognise the unknow object by comparing it with the already given data. Computer Vision is a combination of Image Processing and Machine vision, and will analyse the image detailed to produce proper result.
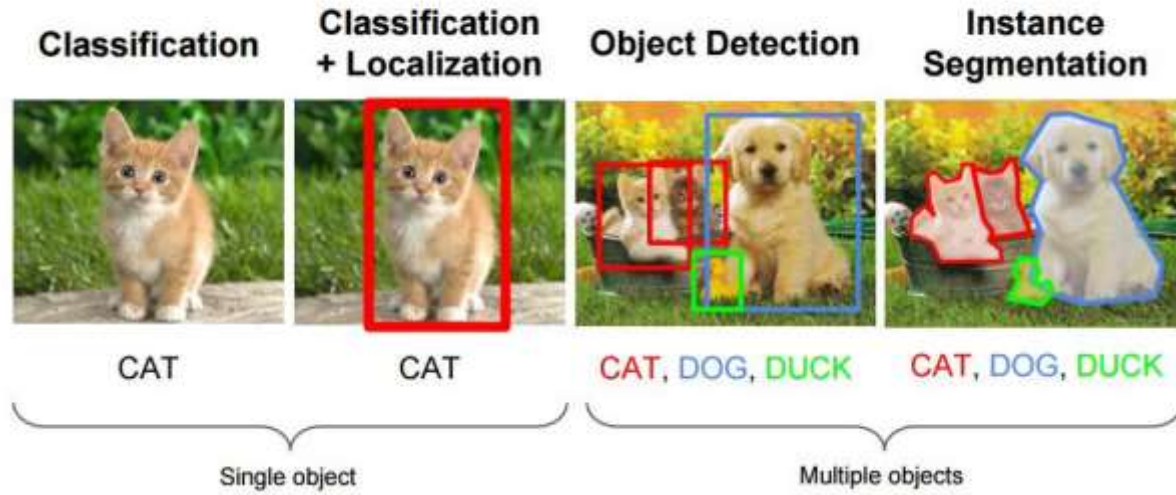
The few tasks that are expected to be done by the CV are object classification, object identification, object verification, object detection, object landmark detection, object segmentation, object recognition and many other.

Deep Learning has a played a vital role in CV. Before using CV without Deep Learning, it was able to do very less task and required more efforts like creating data base to keep track of images, keeping annotation of images and had to capture new images if required for more accuracy. After all this task then the system would finally compare the existing data with the new images to identify the images. But Deep Learning has helped in gathering more amount of data with the help of powerful algorithms. Now a day's applications like cancer detection, self-driven cars and, facial recognition use Deep learning.

Applications of Computer Vision are:

Self-Driven Cars.

Facial Recognition.

Augmented Reality and Mixed Reality.

Healthcare.

Defence and Security.

Though there is so much progress in field of Computer Vision there is much more to achieve. The main aim of CV is to mimic human brain which has to be achieved. But still CV has found its way in health institutions and other enterprises.

AUGMENTED REALITY

AUGMENTED REALITY   **LAVANYA CHAMARTHI – II MCA**

INRODUCTION:

Augmented Reality (AR) is a new technology that involves the overlay of computer graphics on the real world. One of the best overviews of the technology is that defined the field, described many problems, and summarized the developments up to that point. That paper provides a starting point for anyone interested in researching or using Augmented Reality. AR is within a more general context termed Mixed Reality (MR) which refers to a multi-axis spectrum of areas that cover Virtual Reality (VR), AR, telepresence, and other related technologies.

Augmented reality displays superimpose information in your field of view and can take you into a new world where the real and virtual worlds are tightly coupled. It is not just limited to desktop or mobile devices. The Google Glass, a wearable computer with optical head-mounted display, is a perfect example.

AUGMENTED REALITY COMPONENTS:

Scene Generator: The scene generator is the device or software responsible for rendering the scene. Rendering is not currently one of the major problems in AR, because a few virtual objects need to be drawn, and they often do not necessarily have to be realistically rendered in order to serve the purposes of the application.

Tracking System: The tracking system is one of the most important problems on AR systems mostly because of the registration problem. The objects in the real and virtual worlds must be properly aligned with respect to each other, or the illusion that the two worlds coexist will be compromised. For the industry, many applications demand accurate registration specially on medical systems.

Display: The technology for AR is still in development and solutions depend on design decisions. Most of the Displays devices for AR are HMD (Head Mounted Display), but other solutions can be found. Display technology continues to be a limiting factor in the development of AR systems. There are still no see-through displays that have sufficient brightness, resolution, field of view, and contrast to seamlessly blend a wide range of real and virtual imagery.

AUGMENTED REALITY USE CASES AND REALWORLD APPLICATIONS:

Manufacturing: 3D augmented reality saves time and money

In industries like the manufacturing industry, you can't afford making a single mistake in the development process. A minor error can become the reason for re-building or improving an existing product, which will be both costly and time-consuming. Augmented reality provides an excellent solution for easily spotting manufacturing errors. The technology, with its potential to digitize the product prototyping in 3D, makes it easier to access and understand the prototype. The business leaders can easily make the right decision and their team can act effectively. This increases the speed of the process along with the efficiency rate, which ultimately enhances the overall experience and profit generated.

Healthcare: Organ modelling helps save live

AR technology is also disrupting the world of healthcare by breaking down complex medical concepts into interactive 3D forms. This way, AR helps empower medical experts to describe ailments and treatments more easily to patients and trainees. 3D visualizations of organs from different angles help surgeons make more precise stitches and increase success ratios.

Marketing: Augmented reality makes ads pop

AR adds life to formerly static marketing mediums. It enables marketers to include 3D animations, video and targeted information into AR-based storefronts, brochures, posters, t-shirts, flyers, and billboards. Doing so provides a lucrative and seamless experience to the targeted audience.

Travel: Take 360-degree tours of vacation destinations right from a phone

The technology can give travellers access to information written in pamphlets and other sources by converting it into useful, spoken conversation. It can offer 360-degree tours of guest rooms, restaurants, meeting facilities, and other venues. And it can empower travellers to plan and anticipate visits to nearby events and places before they even leave the comfort of their rooms.

CONCLUSION:

To tap this huge market, consumers need to be educated about benefits of augmented reality solutions. At 3Pillar, our mobile development team has developed augmented reality solutions which are available for licensing to clients. With our 'product mindset' approach, we are providing robust AR solutions that are tailor-made for our customers.

INTERNET OF THINGS
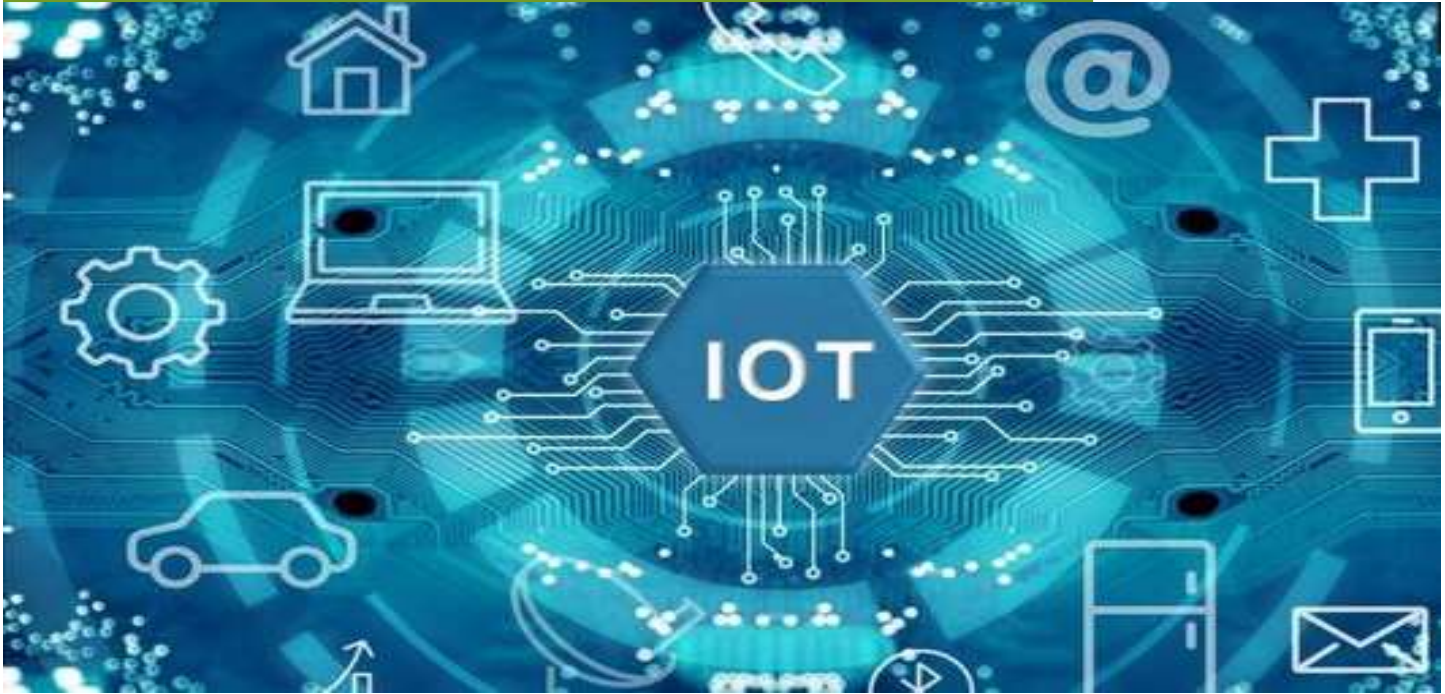
The **Internet of things** (**IoT**) describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.

The definition of the Internet of things has evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. There are a number of serious concerns about dangers in the growth of IoT, especially in the areas of privacy and security, and consequently industry and governmental moves to address these concerns have begun including the development of international standards.[5]

The extensive set of applications for often divided into consumer, commercial, industrial, and infrastructure spaces.

CONSUMER APPLICATION

A growing portion of IoT devices are created for consumer use, including connected vehicles, home automation, wearable technology, connected health, and appliances with remote monitoring capabilities.

SMART HOME

IoT devices are a part of the larger concept of home automation, which can include lighting, heating and air conditioning, media and security systems and camera systems. Long-term benefits could include energy savings by automatically ensuring lights and electronics are turned off.

A smart home or automated home could be based on a platform or hubs that control smart devices and appliances For instance, using Apple's Home Kit, manufacturers can have their home products and accessories controlled by an application in iOS devices such as the iPhone and the Apple Watch. This could be a dedicated app or iOS native applications such as Siri This can be demonstrated in the case of Lenovo's Smart Home Essentials, which is a line of smart home devices that are controlled through Apple's Home app or Siri without the need for a Wi-Fi bridge. There are also dedicated smart home hubs that are offered as standalone platforms to connect different smart home products and these include the Amazon Echo, Google Home, Apple's HomePod,.

IOT SENSOR NODE BLOCK DIAGRAM

The Internet of Things (IoT) is about interconnecting embedded systems, bringing together two evolving technologies: wireless connectivity and sensors. These connected embedded systems are independent microcontroller-based computers that use sensors to collect data. These IoT systems are networked together usually by a wireless protocol such as WiFi, Bluetooth, 802.11.4, or a custom communication system. The networking protocol is selected based on the distribution of nodes and the amount of data to be collected.

This data is sent over the network to the main hub or computer. This main computer collects and analyzes the data, storing it in memory and even making system decisions based on the results of the analysis.

Crucial to modern IoT nodes is the need for security with some form of data encryption, the most common being AES256. This security is critical for helping the microcontroller perform a secure boot, insuring that the core is running the code is meant to run. Encryption security is also used to encrypt the data transmitted over the network, insuring that it is viewed only by those systems authorized to receive the data.