Government Polytechnic, Aurangabad

(An Autonomous Institute of Govt. of Maharashtra-Estd. In 1955) Government Polytechnic, Osmanpura, Aurangabad - 431005, Maharashtra State, India





Computer Engineering Department presents

TECHNICAL MAGAZINE



2022 - 2023 VOLUME1 - ISSUE 2

Presented by Computer Department



Vision

A center of excellence in the domain of Computer Science & Engineering to cultivate "digital artifacts" for society.



- To impart education in computer hardware and software required for industry and business.
- Developing skills resembling problem solving, interpersonal skill, high order thinking skill and logical reasoning for entrepreneurship and employment.
- Developing values and ethics for lifelong learning in the system environment.





Smt. Shwetal S. Jaiswal

(HOD) **Computer Department**

Vedanti Vitthal Yerawar

(Editor-in-Chief)

(Editor)

Shri. Gajanan U. Jadhav

(Lecturer) **Computer Department**

Dakshayani Jagdish Vaishnav (Editor-in-Chief)

Sneha Abhijeet Bhalerao Siddhi Rajendra Khandarkar (Editor)

ZIGBEE TECHNOLOGY

ABSTRACT

In this present communication world, rate there are numerous high data communication standards that are available, but none of these meet the sensors' and control devices' communication standards. These high data-rate communication standards require low-latency and low-energy consumption even at lower bandwidths. The available proprietary wireless systems' Zigbee technology is low-cost and lowpower consumption and its excellent and characteristics make this superb communication best suited for several embedded applications, industrial control, and home automation, and so on.

INTRODUCTION

Zigbee communication is specially built for control and sensor networks on IEEE 802.15.4 standard for wireless personal area networks (WPANs), and it is the product from Zigbee alliance. This communication standard defines physical and Media Access Control (MAC) layers to handle many devices at low-data rates. These Zigbee's WPANs operate at 868 2.4 MHz. 902-928MHz, and GHz frequencies. The data rate of 250 kbps is best suited for periodic as well as intermediate two-way transmission of data between sensors and Controllers. ZigBee is an open, global, packet-based protocol designed to provide an easy-to-use architecture for secure, reliable, low power wireless networks. Flow or process control equipment can be place anywhere and still communicate with the rest of the system.



Zigbee is a low-cost and low-powered mesh network widely deployed for controlling and monitoring applications where it covers meters within the range. 10-100 This communication system is less expensive and simpler than the other proprietary short-range wireless sensor networks as Bluetooth and Wi-Fi. Zigbee supports different network configurations for the master to master or master to slave communications. And also, it can be operated in different modes as a result the battery power is conserved. Zigbee networks are extendable with the use of routers and allow many nodes to interconnect with each other for building a wider area network. ZigBee Network supports many types of topologies, the popular one being - star and peer to peer topologies. Each network topology consists of three types of nodes -ZigBee Coordinator, ZigBee Router and ZigBee End Device. The Coordinator performs the task of allocating unique address to each device in the network, initiates and transfers messages in the network and selects a unique identifier for the network. ZigBee devices are of two types -Full Function Device (FFD) and Reduced Function Device (RFD)

HISTORY OF ZIGBEE TECHNOLOGY

In the year 1990, the digital radio networks with self-organizing ad hoc were implemented. The Zigbee specification like IEEE 802.15.4-2003 was approved in the year 2004, on December 14. The Specification 1.0 was announced by Zigbee Alliance in the year 2005, on June 13, called the Specification of ZigBee 2004.

CLUSTER LIBRARY

In the year 2006, September, the Specification of Zigbee 2006 was announced by replacing the 2004 stack. So this specification mainly replaces the pair structure of key-value as well as message utilized within the 2004 stack through a cluster library. A library includes a set of consistent commands, planned beneath groups called clusters with names like Home Automation, Smart Energy & Light Link of ZigBee. In the year 2017, the library was renamed with Dotdot by Zigbee Alliance and announced as a new protocol. So. this Dotdot has worked for approximately all Zigbee devices as the default application layer.

ZIGBEE PRO

In the year 2007, Zigbee Pro like Zigbee 2007 was finalized. It is one kind of device which operates on a legacy Zigbee network. Because of the disparities within the options of routing, these devices should turn into non-routing ZEDs or Zigbee end devices (ZEDs) on a legacy Zigbee network. The legacy Zigbee devices have to turn into Zigbee end devices on a network of Zigbee Pro. It functions through the 2.4 GHz ISM band as well as includes a sub-GHz band. Zigbee supports several network topologies; however, the most commonly used configurations are star, mesh, and cluster tree topologies. It is very less as compared with the less speed of WiFi.



Industrial Automation: In manufacturing and production industries, a communication link continually monitors various parameters and critical equipment. Hence Zigbee considerably reduces this communication cost as well as optimizes the control process for greater reliability. Home Automation: Zigbee is perfectly suited for controlling home appliances remotely as a lighting system control, appliance control, heating, and cooling system control, safety equipment operations and control, surveillance, and so on. Smart Metering: Zigbee remote operations in smart metering include energy consumption response, pricing support, security over power theft, etc. Smart Grid monitoring: Zigbee operations in this smart grid involve remote temperature monitoring, fault locating, reactive power management, and so on. It can also be moved, since the network doesn't care about the physical location of a sensor, pump or valve. In Zigbee, the data transfer speed is less as compared with WiFi, so it's the highest speed is simply 250kbps.

This is all about a brief description of Zigbee technology's architecture. operations modes, configurations, and applications. We hope that we have given you enough content on this title, for you to understand it better. Thus, this is all about an overview of Zigbee technology and it is based on IEEE 802.15.4 network. The designing of this technology can be done extremely strong so it operates in all kinds of environments. It provides flexibility as well as security for different environments. Zigbee technology has gained so much popularity in the market because it provides consistent mesh networking by enabling a network to control over an extensive region, and also it provides low-power communications. So this is a perfect IoT technology. Zigbee system structure consists of three different types of devices as Zigbee Coordinator, Router, and End device. Every Zigbee network must consist of at least one coordinator which acts as a root and bridge of the network. The coordinator is responsible for handling and storing the information while performing receiving and transmitting data operations.





CONCLUSION

ZigBee is a wireless technology which uses a mesh network to interconnect various devices. The main feature of ZigBee which led to its development is its design for low power and short distance devices. The architecture of ZigBee includes network layer, application layer, application sub-layer, media access control, and physical layer and the service access entry point interconnects these layers. ZigBee communication includes three main devices which are ZigBee Coordinator, ZigBee Router and ZigBee End Device. One of the many advantages of ZigBee is its strong authentication and security services which makes it the preferred wireless technology. It is widely used in Home Automation and IoT devices.

Author:

- 1. Purti Dinesh Patil
- 2. Dhanshree Laxmikant Borde
- 3. Revati Sunil Upadhye
- 4. Mansi Santosh Khandre

CYBER SECURITY

INTRODUCTION

Cyber security is the practice of protecting systems, networks, and programs from digital attacks. These cyber attacks are usually aimed at accessing, changing, or destroying sensitive information; extorting money from users; or interrupting normal business processes. Implementing effective cyber security measures is particularly challenging today because there are more devices than people, and attackers are becoming more innovative.

- Cybersecurity is the practice of protecting critical systems and sensitive information from digital attacks. Also known as information technology (IT) security, cybersecurity measures are designed to combat threats against networked systems and applications, whether those threats originate from inside or outside of an organization.
- Cyber security is the practice of protecting systems, networks, and programs from digital attacks.
- Cyber attacks are usually aimed at accessing, changing, or destroying sensitive information; extorting money from users; or interrupting normal business processes.
- Implementing effective cyber security measures is particularly challenging today because there are more devices than people, and attackers are becoming more innovative.



IMPACT

All the cyber security principles are grouped under governing, detecting, protecting, and responding to activity, and these principles are:

- 1.It secure configuration
- 2. Provide network security
- 3.Manage user privileges
- 4.User education and awareness

A security breach is any incident that results in unauthorized access to computer data, applications, networks or devices

It results in information being accessed without authorization. Typically, it occurs when an intruder is able to bypass security mechanisms. Technically, there's a distinction between a security breach and a data breach

APPLICATIONS

- Protects against malware, ransomware, phishing, and social engineering in business.
- Cybersecurity protects the data and networks.
- Digital assets are protected by preventing unauthorized users from accessing them.
- Cyber Security provides protection for end-users and their personal information.
- The recovery time after a breach is improved.
- Cyber Security provides protection for end-users and their personal information.
- Confidence is improved in the organization because of cybersecurity.
- Web Firewall

What are the career opportunities in cybersecurity?

IT professionals and other computer specialists are needed in security roles, such as:

Chief information security officer (CISO) Chief security office (CSO) Security engineers Security architects





LEVELS OF SECURITY

Network security is the practice of securing a computer network from intruders, whether targeted attackers or opportunistic malware.

Application security focuses on keeping software and devices free of threats. A compromised application could provide access to the data its designed to protect.

 \cdot Information security protects the integrity and privacy of data, both in storage and in transit

Operational security includes the processes and decisions for handling and protecting data assets. The permissions users have when accessing a network and the procedures that determine how and where data may be stored or shared all fall under this umbrella.

DISADVANTAGES

 Difficult To Set Up : A cyber security system is difficult to set up for an average user. It requires professional technical knowledge and a professional to implement them and make them work. Thus, random installation of cyber security by regular people is not possible which makes it harder for the system to reach the masses.

- Constant Need To Update The Security : Technology advances every minute and so does the security system. The user has to keep in mind to update his security system regularly to keep his device safe. Any missed update can put the whole system at a huge risk and compromise it.
- Expense Of Setting Up The Whole
 System : Cyber security systems might be convenient to set up for the big farms, companies, and organizations, but not for individuals who might possess sensitive data that needs to be protected. The hindrance is the huge expense that is associated with it.
- Security Patches May Back-Fire : When your content management system releases a new security update or patch, hackers can compare the patched and unpatched files to know the weaknesses that are mended in the patched file. Then they can attack the files that are unpatched. Hence, the security patches may backfire on the very system it was meant to secure.
- Incorrectly Configured System Blocks Firewall : If the firewall is configured incorrectly, it blocks certain services and actions of the user. This stays until the firewall is configured correctly, which requires the intervention of a professional, thus making it hard to work with a person who is not familiar with the technology.
- Makes The System Slower :Better security is synonymous with a greater number of passwords and more and more checking of the files by the security system, all of which takes time and thus slows down both the system and the productivity of the person working.



CONCLUSION

There are no magic solutions or even combinations of solutions (cybersecurity applications) that will "fix the issue" permanently since none of these variables is anticipated to alter shortly.

Innovation creates new IT applications. However, it also creates new opportunities for criminals, terrorists, and other adversaries to operate. As a result, improving a system's cybersecurity posture must be seen as a continuous effort rather than something that can be completed once and then ignored.

Author: 1.Vishal Berad 2.Sushil Bharudkar 3.Krishna Choundiye

LIGHT FIDELITY (LI-FI) TECHNOLOGY

ABSTRACT

During this Pandemic time a day without Internet is unimaginable. At present the most widely used non-cellular wireless technology is Wi-Fi (Wireless Fidelity). It is based on radio wireless local area networking of devices based on IEEE 802.11 standards operating at the frequency range of 2.4GHz (12cm) UHF (Ultra High Frequency) and 5.8GHz (5cm) SHF (Super High Frequency) is probably the most popular used non-cellular wireless technology. Now imagine a world where each LED Light in and around Hospitals can connect us to high speed wireless internet with a simple flickering of light which is Li-Fi or Light Fidelity which is a new way of sending data wireless.

INTRODUCTION

"Li-Fi stands for Light Fidelity or Wireless Optical Communication Visual Light or Communication, first coined by German Scientist Professor Harald Haas on july2011". Li-Fi is a wireless optical networking technology that uses light between 400 and 800 terahertz(THz)from Light Emitting Diodes(LEDs) rather than Radio frequencies to transmit data...

Upto100Gbps or higher can even be transmitted via Li-Fi, but this involves a transition in lighting technologies. Recent tests have proven Li-Fi to be 100 times faster than Wi- Fi.

As the speed of light is very high so the data transmission speed via the light is also high. Transfer of data from one place to another is one of the most important day -today activities

HISTORY AND FUTURE OF LI-FI

The technology underpinning Li-Fi was pioneered by German Physicist Harald Hass, currently based at university of Edinburgh in UK. Haas coined the term Li-Fi(Light Fidelity) in 2011 in the context of a talk presenting the new technology at the TED (Technology Entertainment and Design) Global conference.



The Li-Fi technology can be used for it matters the data various purposes, transmission through LEDs thus all the screens which illuminate light can be served as a platform for data communication. The screen of the mobile phone, television, bulbs can act as a source of light. On the other hand, the receiving platform, the photo detector can be replaced by a camera in mobile phone for scanning and retrieving data. Its other applications are Li-fi for desktops, smartcard Li-fi, Li-fi for schools, hospitals, Li-fi in cities, smart guides, museums, fairgrounds, events indoor hotels, and LBS(Location-based Services), access control and identification crisis, malls, airport and dangerous environments like thermal power plants.

WORKING PRINCIPAL OF LIFI

The Li-Fi operating theory is very simple: If the LED is ON, a digital signal 1 is transmitted, if its OFF, a digital signal 0 is transmitted. A light emitter (LED) is present on the transmitter side and a photo detector (light sensor) is present on the receiver side.It is this photo detector that records binary 1 and 0 by clicking ON and OFF Lights.With this technology, each and every LED light source will serve as a hub for data transmission



BENEFITS OF LI-FI

Efficiency: Due to the existence of LED bulbs that are always available everywhere, Li-Fi holds the potential to be more energy efficient and cheaper

Speed and Bandwidth: Li-Fi has the capacity to deliver multiple Gbps speeds in mobile devices. As the light spectrum is about 10,000 times wider than the spectrum covered by radio waves, light waves have the potential to hold more information .

Security: In case of Li-Fi, invisible artefacts block illumination, making Li-Fi safer than any other technology.

Utilization: Li-Fi can be used in places where Wi-Fi cannot be used or barred such as under water, aircraft cabins and nuclear power plant.

APPLICATION OFLI-FI

- Smart homes
- LI-FI in schools
- Enterprise Wireless solution
- · LI-FI in hospital
- LI-FI in pharmacies and the pharmaceutical industry
- · LI-FI and industries
- · LI-FI at navy
- Road Safety and Traffic Management



CONCLUSION

Li-Fi is an emerging technology and it has vast application. On implementing this technology it is possible to use every bulb as a hotspot to transmit wireless data. In this data can be transmitted via through light. Instead of using this hazardous radio waves, we can co- ordinate using light. This technique will help to create the cleaner, safer, greener and a resplendent future.. Li-Fi is the future technology of data transmission. Since it is easy to generate light waves, it is very advantageous and easily implementable in various fields. Hence the future application can be extended to the various fields like Traffic

AUTHOR 1.Aditi Sudhakar Patil 2.Harshada Arjun Sawai

AUGMENTED REALITY

INTRODUCTION

Augmented reality or AR is a technology that allows a live view of the realworld elements that are being augmented by the computer or a piece of software. Many consider augmented reality to be a part of a wider general concept called computermediated reality in which the live view is modified using different technologies of pieces of software. Unlike virtual reality or augmented reality enhances VR. the perception of reality. Virtual reality, on the other hand, creates a completely new reality. Even though augmented reality has been present as a concept for quite a lot, only recently it has gained a lot of attention with the introduction of Pokemon Go app that took the world by storm. Currently, companies all over the world are using AR to do things that previously demanded a lot of work hours and a lot of devotion. For example, the car industry is currently using AR in order to design new cars and AR has made that process much easier and much faster than before.

In the past, companies like Google have attempted to introduce this technology to the market with the Google Glass but that was not a successful attempt. It seems that all the major technology companies are ready to give a second chance as Google and Apple have announced the return of augmented reality.

Both, augmented and virtual reality have first come with the entertainment purpose but since then, AR and VR have spread their use on many different fields. Many believe that augmented reality will become a shortcut between the human brain and other technologies.



AR has caused a lot of people to open their minds to new things and who wouldn't when while wearing Google Glasses for example and upon meeting a friend, you will have all information about that person including phone number, e-mail, profiles on social networks available to you in a blink of an eye without having to look on your phone or other devices.

Augmented reality is largely synonymous with mixed reality. There is also overlap in terminology with extended reality and computer-mediated reality.

The primary value of augmented reality is the manner in which components of the digital world blend into a person's perception of the real world, not as a simple display of data, but through the integration of immersive sensations, which are perceived as natural parts of an environment. With the help of advanced AR technologies (e.g. adding computer vision, incorporating AR cameras into smartphone applications, and object the information about recognition) the surrounding real world of the user becomes interactive and digitally manipulated.

ASURVEY OF THE RESEARCH & PROGRESS IN A UGMENTED REALITY TECH NOLOGY

re In rcent years, there has been a strong atmosphere in the research of augmented reality technology at home and abroad. The number of relevant seminars is increasing. presenting new ideas or reports. With both AR and VR, the information about the real world become interactive as well as manipulative as a person will have access to those pieces of information all the time.

The development of AR and VR has caused a revolution in the way we perceive the world. Now, it is not only enough to be aware of the reality that surrounds you but a person must have access to all kinds of information in a blink of an eye. Because of that, AR, as well as VR, have found their use in the everyday life. Having all information available to you by only wearing high-tech glasses and being able to activate and command it using only voice is something that we have seen only in sciencefiction movies. However, with the development of AR and VR, that science-fiction became reality very quickly. First attempt to bring these technologies to wider population might have failed but it is just matter of time when VR and especially AR will become a part of everyday life. Pokemon GO has done a great thing in bringing this technology closer to common people and with different studies indicating how these technologies can benefit different fields, it is expected that augmented and virtual reality will become a part of the everyday life in a very short period of time.

Academic journals and international conferences provide researchers with a full space for communication. Its research focus from simple system framework, hardware tracking technology, to the current interactive performance evaluation.



At present, academic institutions engaged augmented reality technology research in include the University of North Carolina, Massachusetts Institute of Technology, Columbia University, Boeing company and SONY computer science laboratory. Foreign universities and research institutions that focus on AR technology generally focus on the algorithms, human-computer interaction methods, software and hardware infrastructure platforms in the core of technology. Among them. Human the well-known Interface Technology Lab of the University of Washington Seattle. in USA, supports the research ARToolKit open source project is the industry's first mature AR engine based on rectangular identification mark for 3D space registration [2]. There are few universities and research institutions involved in AR technology in China, Α

KEY TECHNOLOGIES OF AUGMENTED REALITY INTELLIGENT DISPLAY TECHNOLOGY

3D registration technology and intelligent interaction technology constitute the core technology circle of AR and play an important role in the development of AR.

1. Intelligent display technology

According to relevant data, more than 65% of the information acquired by human beings comes from their own vision, which has become the most intuitive way for human beings to interact with the real environment. With the development of intelligent display technology, augmented reality becomes a possibility, which is pushed to a new height by the various kinds of display devices generated on intelligent display technology. based Specifically, there are three main categories of display devices that occupy an important position in the field of AR technology today. First, helmet display (HMD) was born in 1968. perspective helmet The optical display developed by professor Ivan Sutherland makes it possible to superimpose simple graphics constructed by computers on real scenes in real time. In the later development, optical perspective helmet-mounted display and video perspective helmet-mounted display constitute the backbone of helmet-mounted display. Second, handheld device display, relying on the augmented reality technology of handheld display, handheld device display is very light, small, especially the popularity of smart phones, through video perspective to the use of augmented reality technology to present. Third, other display devices, such as PC desktop displays, match the real-world scene information captured by the camera to a three-dimensional virtual model generated by the computer and are ultimately displayed by the desktop display.



2. 3D registration technology

As one of the most critical technologies in the augmented reality system, 3d registration technology enables virtual images to be superimposed accurately in the real environment. The main flow of 3d registration technology has two steps. First, determine the relationship between the virtual image, the model and the direction and position information of the camera or display device. Second, the virtual rendered image and model are accurately projected into the real environment, so the virtual image and IOP Conf. Series: Journal of Physics: Conf. Series 1237 (2019) 022082 IOP Publishing doi:10.1088/17426596/1237/2/022082 3 model can be merged with the real environment. There are various ways of 3d registration, such as the registration technology based on hardware tracker, the 3d registration technology based on computer vision, the 3d registration technology based on wireless network and the mixed registration technology, among which the former two are the most popular.

CONCLUSION

Virtual reality and Augmented reality are inverse reflections of one in another, regarding what each technology wants to accomplish. Augmented reality overlays virtual elements in the real world, while virtual reality digitally recreates a real-life setting.

Both Virtual Reality and Augmented Reality are going to become mainstream soon. Things are already changing, and before we know it, we are going to be living in a world more virtual, than real.

Author

- 1. Shraddha Vikas Sabde
- 2. Shreya Bhanudas Kakad
- 3. Shreya Yogesh Kulkarni
- 4. Vaishnavi Santosh Joshi

ABILITIES OF LARGE AI MODELS

ABSTRACT:

What movie do these emojis describe?



That prompt was one of 204 tasks chosen last year to test the ability of various large language models (LLMs) the computational engines behind Al chatbots such as ChatGPT. The simplest LLMs produced surreal responses. "The movie is a movie about a man who is a man who is a man," one began. Mediumcomplexity models came closer, guessing The Emoji Movie. But the most complex model nailed it in one guess: Finding Nemo.

"Despite trying to expect surprises, I'm surprised at the things these models can do," said Ethan Dyer, a computer scientist at Google. Computer scientists anticipated that scaling up would boost performance on known tasks, but they didn't expect the models to suddenly handle so many new, unpredictable ones.

Recent investigations like the one Dyer worked on have revealed that LLMs can produce hundreds of "emergent" abilities - tasks that big models can complete that smaller models can't, many of which seem to have little to do with analyzing text. multiplication Thev range from to generating executable computer code to, apparently, decoding movies based on emojis. New analyses suggest that for some tasks and some models, there's a threshold of complexity beyond which the functionality of the model skyrockets.



"That language models can do these sort of things was never discussed in any literature that I'm aware of," said Rishi Bommasani, a computer scientist at Stanford University. Last year, he helped compile a list of dozens of emergent behaviors, including several identified in Dyer's project. That list continues to grow. Now, researchers are racing not only to identify additional emergent abilities but also to figure out why and how they occur at all in essence, to try to predict unpredictability. Understanding emergence could reveal answers to deep questions around AI and machine learning in general, like whether complex models are truly doing something new or just getting really good at statistics.

"We don't know how to tell in which sort of application is the capability of harm going to arise, either smoothly or unpredictably," said Deep Ganguli, a computer scientist at the Al startup Anthropic.

THE EMERGENCE OF EMERGENCE

Biologists, physicists, ecologists and other scientists use the term "emergent" to describe self-organizing, collective behaviors that appear when a large of things acts collection as one. Combinations of lifeless atoms give rise to living cells; water molecules create waves; murmurations of starlings swoop through the sky in changing but identifiable patterns; cells make muscles move and hearts beat.

Critically, emergent abilities show up in systems that involve lots of individual parts. But researchers have only recently been able to document these abilities in LLMs as those models have grown to enormous sizes.

Language models have been around for decades. Until about five years ago, the most powerful were based on what's called a recurrent neural network.

As with the movie emoji task, researchers had no reason to think that a language model built to predict text would convincingly imitate a computer terminal.





These essentially take a string of text and predict what the next word will be. What makes a model "recurrent" is that it learns from its own output: Its predictions feed back into the network to improve future performance.

In 2017, researchers at Google Brain introduced a new kind of architecture called a transformer. While a recurrent network analyzes a sentence word by word, the transformer processes all the words at the same time.

Transformers enabled a rapid scaling up of the complexity of language models by increasing the number of parameters in the model, as well as other factors. The parameters can be thought of as connections between words, and models improve by adjusting these connections as they churn through text during training. As expected, a 2020 analysis by OpenAl researchers found that models improve in accuracy and ability as they scale up, which describes an LLM's ability to solve problems it has never - or rarely - seen before. This has been a longtime goal in artificial intelligence research, Ganguli said.

BEYOND IMITATION

In 2020, Dyer and others at Google Research predicted that LLMs would have transformative effects - but what those effects would be remained an open question. So they asked the research community to provide examples of difficult and diverse tasks to chart the outer limits of what an LLM could do. This effort was called the Beyond the Imitation Game Benchmark (BIG-bench) project, riffing on the name of Alan Turing's "imitation game," a test for whether a computer respond to questions in could а convincingly human way. (This would later become known as the Turing test.)

The group was especially interested in examples where LLMs suddenly attained new abilities that had been completely absent before.





CONCLUSION

Emegence reveals both surprising potential and unpredictable risk. Applications of these large LLMs are already proliferating, so a better understanding of that interplay will help harness the diversity of abilities of language models.

Author:

- 1. Sneha Narendra Alwane
- 2. Dhanshree Ramesh Shelke

CHATGPT

ABOUT CHATGPT

ChatGPT, developed by OpenAI, is a powerful language model that enables conversational interactions with human-like text responses. It is built upon the GPT-3.5 architecture, which is a state-of-the-art deep learning model trained on vast amounts of diverse data to umder manner. One of the key capabilities of ChatGPT is its contextual understanding, allowing it to generate responses that are relevant to the given conversation. It can interpret and respond to user inputs, follow the conversation flow, and provide coherent and meaningful responses. This makes ChatGPT well-suited for various conversational applications, such as customer support, virtual assistants, and chatbots, where it can engage in dynamic interactions with us. It can generate responses in different voices, personalities, and languages, making it a versatile tool for creating engaging and interactive conversational experiences. This adaptability allows ChatGPT to be customized.

Despite its advanced capabilities, ethical considerations are crucial when using ChatGPT. Bias in generated content is one concern, as the model can inadvertently reflect existing biases present in the data it was trained on. Privacy is another concern, as conversations may contain sensitive information. OpenAl has implemented prompt engineering techniques, robustness testing, and responsible AI practices to mitihe notable features of ChatGPT is its ability to engage in conversations in a dynamic and interactive manner. OpenAI has made efforts address ethical considerations with to ChatGPT.



FUTURE OF CHATGPT

The future of ChatGPT is promising, as it continues to evolve and advance in the field of conversational AI. Here are some potential directions for the future of ChatGPT:

1.Improved Contextual Understanding: ChatGPT can further enhance its contextual understanding capabilities, allowing it to better comprehend the nuances of conversations, infer user intents accurately, and generate more contextually relevant responses.

2.Customization and Personalization: ChatGPT can be further customized and personalized to suit specific domains, industries, or user preferences. This can involve training ChatGPT on domain-specific data to make it more specialized in certain areas, or allowing users to personalize . so this can be the personalisation and utilization.

CHATGPT WORKING

ChatGPT works by leveraging its deep learning architecture and extensive training data to process and generate textbased responses in a conversational manner. Here's an overview of how ChatGPT typically works:

1. input Prompt: ChatGPT receives a text-based input prompt from a user, which serves as the starting point for the conversation. The prompt can be a question, statement, or any other text-based input that provides context for the conversation.

2.Contextual Understanding: ChatGPT uses its transformer-based architecture to analyze the input prompt and understand the context of the conversation. This involves interpreting the meaning of the prompt, identifying relevant keywords, and considering the context of previous messages in the conversation, if any.

3.Response Generation: Based on the contextual understanding, ChatGPT generates a text-based response that is coherent and contextually relevant to the input prompt. The response can be in the form of an answer, recommendation, or any other relevant information.





CHATGPT IN POPULAR CULTURE

ChatGPT, as a cutting-edge conversational AI technology, has garnered significant attention and has been featured in various popular culture mediums. Here are some examples.

1. Media Appearances: ChatGPT has been featured in popular media outlets, such as Forbes, Wired, and The Verge, among others. Articles, news segments, and interviews discussing the capabilities, potential impact, and implications of ChatGPT have been widely covered in popular culture

2. Social Media: ChatGPT has gained popularity on social media platforms, with users sharing their experiences, interactions, and even humorous or creative exchanges with ChatGPT. Users often showcase the responses generated by ChatGPT, creating memes, jokes, and other creative content related to the technology.

One example of GPT being referenced in popular culture is in the 2019 film "Ad Astra". In the movie, the main character uses an Al language model called the "GPT-19" to communicate with his father who is lost in space. While the name is slightly different, it's clear that this is a reference to the GPT-2 language model developed by OpenAI. This demonstrates how GPT and other language models are starting to become more well-known and integrated into popular culture

CHATGPT IMPORTANCE

ChatGPT holds significant importance in several key are the include,Enhanced User Experience: ChatGPT can provide a more interactive, personalized, and user-friendly experience in various applications, such as customer support, virtual assistants, and interactive storytelling. It can understand and respond to user inquiries and provide relevant information, recommendations, and solutions, leading to improved user satisfaction and engagement.

1.utomation and Efficiency: ChatGPT can automate routine tasks and streamline processes in industries such as customer service, e-commerce, and content creation. It can handle repetitive tasks, answer frequently asked questions, and generate content, freeing up human resources to focus on more complex and creative tasks.

2.Access to Information: ChatGPT can provide access to information and knowledge in real-time, helping users find answers to their questions, learn new things, and stay informed. This can be particularly valuable in educational, research, and informationseeking contexts, where ChatGPT can assist users in obtaining accurate and relevant information.

3.One important aspect of ChatGPT is its ability to process natural language and generate human-like responses, which makes it a valuable tool for improving customer experience, increasing efficiency in communication, and facilitating seamless interactions between humans and machines in various industries. The big question a lot of people have about ChatGPT is why does it matter? We've already seen the huge wave of Al image generators and heard everything from glowing praise to doom and gloom. How does ChatGPT fit into the narrative around AI? ,It's safe to say ChatGPT will have more of an impact on the average person .



CONCLUSION

ChatGPT is a cutting-edge conversational Al technology that has the potential to revolutionize various aspects of our society. Its advanced capabilities in understanding and generating human-like responses have opened up new opportunities in customer service, virtual assistance, content creation, education, and many other fields. ChatGPT has gained popularity in popular culture through media coverage, social media applications. interactions. entertainment influencer collaborations. and futuristic depictions, showcasing its impact and potential.

ChatGPT is a powerful language model that utilizes the GPT-3.5 architecture to understand and respond to human language in a natural and intuitive way, making it a valuable tool for a wide range of applications, including customer service, language translation, and content creation.

Author: 1.Sanjivani dobhal 2.Sneha magre

COGNITIVE COMPUTING

ABSTRACT

Cognitive computing represents selflearning systems that utilize machine learning models to mimic the way the brain works. Eventually this technology will facilitate the creation of automated IT models which are capable of solving problems without human assistance. The Cognitive computing is the imitation of the thought process of the human beings using a sophisticated computerized model. Many aspects of Cognitive computing and its applications are discussed in this article.

INTRODUCTION

In general, the term cognitive computing has been used to refer to hardware and/or software that mimics the functioning of the human brain and helps to improve human decision-making.

Let's examine the above definition bv considering the situation of an intelligent robot. You own this robot, and the purpose of this robot is to give you the best advice, so that you can make your decisions faster. Currently we make most of our decisions on the basis of past experiences and gutfeelings. Now, imagine the power the abovementioned robot can add to your decision making, provided that the robot will be able to traverse through thousands or perhaps millions of individual experiences and their results. Conducting an analysis of all this data, this robot will give you the best advice that a human can give. The decision will still be yours, but now your decisions will be solid, accurate and based on facts.



HOW DOES COGNITIVE COMPUTING ACTUAL WORK?

Systems used in the cognitive sciences combine data from various sources while weighing context and conflicting evidence to suggest the best possible answers. To achieve this, cognitive systems include selflearning technologies that use data mining, pattern recognition and NLP to mimic human intelligence. Using computer systems to solve the types of problems that humans are typically tasked with requires vast amounts of structured and unstructured data fed to machine learning algorithms. Over time, cognitive systems are able to refine the way they identify patterns and the way they process data. They become capable of anticipating new problems and modeling solutions. For example, by storing thousands of pictures of dogs in a database, an Al system can be taught how to identify pictures of dogs. The more data a system is exposed to, the more it is able to learn and the more accurate it becomes over time.

COGNITIVE COMPUTING



At present, there is no widely agreed upon definition for cognitive computing in either academia or industry.

In general, the term cognitive computing has been used to refer to new hardware and/or software that mimics the functioning of the human brain and helps to improve human decision-making. In this sense, cognitive computing is a new type of computing with the goal of more accurate models of how the human brain/mind senses, reasons, and responds to stimulus. Cognitive computing applications link data analysis and adaptive page displays (AUI) to adjust content for a particular type of audience. As such, hardware cognitive computing and applications strive to be more affective and more influential by design.

Basic scheme of a cognitive system. With sensors, such as keyboards, touchscreens, cameras, microphones or temperature sensors, signals from the real world environment can be detected. For perception, these signals are recognised by the cognition of the cognitive system and converted into digital information. This information can be documented and is processed. The result of deliberation can also be documented and is used to control and execute an action in the real world environment with the help of actuators, such as engines, loudspeakers, displays or air conditioners for example.

The term "cognitive system" also applies to any artificial construct able to perform a cognitive process where a cognitive process is the transformation of data. information. knowledge, or wisdom to a new level in the DIKW Pyramid. While many cognitive systems employ techniques having their origination in artificial intelligence research, coanitive systems, themselves, may not be artificially intelligent. For example, a neural network trained to recognize cancer on an MRI scan may achieve a higher success rate than a human doctor. This system is certainly a cognitive system but is artificially not intelligent.

Cognitive systems may be engineered to feed on dynamic data in real-time, or near real-time, and may draw on multiple sources of information, including both structured and unstructured digital information, as well as sensory inputs (visual, gestural, auditory, or sensor-provided).



APPLICATIONS

HEALTHCARE

Numerous tech companies are in the process of developing technology that involves cognitive computing that can be used in the medical field. The ability to classify and identify is one of the main goals of these cognitive devices.[17] This trait can be very helpful in the study of identifying carcinogens. This cognitive system that can detect would be able to assist the examiner in interpreting countless numbers of documents in a lesser amount of time than if they did not use Cognitive Computer technology. This technology can also evaluate information about the patient, looking through every medical record in depth, searching for indications that can be the source of their problems.

EDUCATION

Even if cognitive computing can not take the place of teachers, it can still be a heavy driving force in the education of students. Cognitive computing being used in the classroom is applied by essentially having an assistant that is personalized for each individual student. This cognitive assistant can relieve the stress that teachers face while teaching students. while also enhancing the student's learning experience over all.[15] Teachers may not be able to pay each and every student individual attention, this being the place that cognitive computers fill the gap. Some students may need a little more help with a particular subject. For many students, Human interaction between student and teacher cause anxiety and can can be uncomfortable. With the help of Cognitive Computer tutors, students will not have to face their uneasiness and can gain the confidence to learn and do well in the classroom.

While a student is in class with their personalized assistant, this assistant can develop various techniques, like creating lesson plans, to tailor and aid the student and their needs.



CONCLUSION

Cognitive Computing, as by name, simulates human cognition, allowing humans to make the best use of experiences, history, evidences, facts and figures to make confident and accurate decisions. Unlike Artificial Intelligence, which tends to replace human effort in many areas.

Cognitive Computing has a goal to help humans in their everyday tasks and decision making without actually replacing human effort. You can think of a complete cognitive computing system as a Superhuman, who is intelligent, smart, aware, understanding, accurate, helpful and emphatic. Welcome to the future of awesomeness!

Authors :

1. Manodnya Medhe 2.Rutuja Kale 3.Shubhangi Dhating

INTERNET OF THINGS

ABSTRACT

IoT (Internet of Things) is a network of physical devices, vehicles, homes, and other objects that are embedded with sensors, software, and connectivity to enable them to collect and exchange data. The data generated by IoT devices can be analyzed to provide insights and enable decision-making in various industries such as healthcare, manufacturing, transportation, and smart cities.

INTRODUCTION

IoT stands for the Internet of Things, which refers to the connection of physical objects or devices to the internet, allowing them to collect and exchange data with other devices and systems. IoT has the potential to transform industries and change the way we live and work, as it allows for more efficient and smarter decision-making based on real-time data.

The basic components of IoT include sensors or devices that collect data, connectivity technologies that transmit data over the internet or other networks, data processing and storage systems that analyze and store the data, and applications or services that enable users to interact with and make decisions based on the data.

IoT applications are wide-ranging and include smart homes, smart cities, industrial automation, healthcare, agriculture, transportation, and many more. The growth of IoT has also led to concerns about data privacy and security, as the large amounts of data generated by IoT devices can be vulnerable to hacking and misuse. According to Cisco, 500 billion devices are expected to be connected to the internet by 2030



HISTORY OF IOT

The concept of the Internet of Things (IoT) has been around for several decades, but it wasn't until the 1990s that it began to take shape as a real-world application. Here is a brief history of IoT:

1982: A Coke machine at Carnegie Mellon University is connected to the internet, becoming one of the first IoT devices.

1990: John Romkey develops a toaster that can be turned on and off over the internet.

1999: Kevin Ashton, a British technologist, coins the term "Internet of Things" while working for Proctor & Gamble.

2000s: The development of wireless networking technologies such as Wi-Fi, Bluetooth, and RFID enabled more devices to become connected to the internet.

2010s: The rise of cloud computing, big data, and machine learning technologies furthered the development of IoT, allowing for data to be analyzed and used to optimize processes. Today, IoT is a rapidly growing industry. The Internet of Things (IoT) is a system of interconnected devices, objects, and machines that can communicate with each other and with the internet. IoT works through a combination of hardware, software, and network technologies.

Here's a general overview of how IoT works:

- 1. Devices: IoT devices can be anything from sensors, wearables, appliances, vehicles, and more. They are embedded with sensors, processors, and communication technologies that allow them to interact with the environment.
- 2. Connectivity: IoT devices communicate with each other and with the internet through various wireless and wired connectivity options, such as Wi-Fi, Bluetooth, cellular networks, and more.
- 3. Data: IoT devices generate and transmit data, which can include environmental data, biometric data, or other types of data, depending on the device and its purpose.
- 4. Cloud Computing: The data generated by IoT devices is often stored and processed in the cloud..





IOT APPLICATIONS

- 1. Smart Home: IoT devices like smart thermostats, security cameras, and smart appliances allow homeowners to control and monitor their homes remotely.
- 2. Healthcare: IoT devices can be used for remote patient monitoring, wearables to track fitness and health, and medication management systems. They can help doctors and caregivers provide better patient care while reducing hospital visits and improving patient outcomes.
- 3. Industrial Automation: IoT is being used in factories to optimize production, reduce downtime, and improve product quality. IoT sensors can monitor machines, track inventory, and adjust production processes in real-time, reducing waste and improving efficiency.
- 4. Transportation: IoT devices can be used for vehicle tracking, traffic monitoring, and smart parking. IoT sensors can be placed on roads and traffic signals to help manage traffic flow, reduce congestion, and improve road safety.
- 5. Agriculture: IoT can help farmers monitor crops, soil conditions, and weather patterns. IoT sensors can collect data on soil moisture, temperature, and humidity, helping farmers make data-driven decisions to optimize crop yields.

IOT ADVANTAGES

1)Increased efficiency and productivity: IoT can enable the automation of various processes, reducing the need for human intervention and increasing efficiency and productivity.

2) Cost savings: By optimizing processes and reducing waste, IoT can lead to significant cost savings for businesses.

3) Improved decision-making: IoT can provide real-time data and insights, allowing for better decision-making and faster responses to changing conditions.

4)Enhanced customer experiences:IOT can enable personalized and more efficient customer experiences.

5)Remote monitoring and control

IOT DISADVANTAGES

1)Security and privacy concerns: With a large number of devices connected to the internet, there is a risk of data breaches and privacy violations. IoT devices can also be vulnerable to hacking and cyber attacks.

2)Interoperability issues: As IoT devices are developed by different manufacturers, there can be interoperability issues between different devices and systems, making integration and maintenance complex.

3)Dependence on technology: As more processes and systems become automated, there is a risk of over-dependence on technology, leading to potential disruptions and failures.





CONCLUSION

The Internet of Things (IoT) has the potential to revolutionize the way we live and work. IoT is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, and network connectivity, allowing them to collect and exchange data.IOT has numerous applications across various industries, including smart homes, healthcare.

However, the deployment of IoT devices also presents some challenges, including security risks, privacy concerns, and the need for interoperability standards.

Overall, the future of IoT looks promising, and we can expect to see more innovative uses of this technology in the years to come. As the technology advances, it will be essential to address the challenges and risks associated with IoT to ensure its safe and responsible deployment.

Authors :

- 1. Shruti Dapkekar
- 2. Akanksha Khadap
- 3. Pratik Shinde

REFRENCES

https://www.elprocus.com/what-is-zigbeetechnology-architecture-and-its-applications/

https://zigbeealliance.org/wpcontent/uploads/2019/12/07-5123-06-zigbeecluster-library-specification.pdf

https://www.techtarget.com/searchsecurity/de finition/cybersecurity

https://www.checkpoint.com/cyber-hub/cybersecurity/what-is-cybersecurity/

https://www.javatpoint.com/what-is-cybersecurity

https://ieeexplore.ieee.org/document/940468 0

https://www.lifitn.com/blog/2021/2/13/top-30li-fi-applications-updated-list-includingpotential-applications

https://scimag.com/augmented-and-virtualreality/

https://www.linkedin.com/pulse/augmentedreality-karthikeyan-d

https://www.quantamagazine.org/theunpredictable-abilities-emerging-from-largeai-models-20230316/

https://marutitech.com/cognitive-computing-features-scope-limitations/

https://www.linkedin.com/pulse/what-everycio-needs-know-openai-chatgpt-sunil-thakur https://www.toptal.com/designers/ui/augment ed-reality-vs-virtual-reality-vs-mixed-reality

https://en.wikipedia.org/wiki/Cognitive_computing



