Internet of Things: A Review on the Different Types and Application

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ARTICLE DETAILS	ABSTRACT
	This research, discusses the notion of "internet of things", Types, key components and its applications in general. The Internet of Things (IoT) integrate everyday objects to computing, enabling interaction between devices and the global internet infrastructure. Research in IoT spans various areas including applications, security, architecture, and communication technologies. The (IoT) Internet of Things has surfaced as a impactful technology, permitting the connection of somatc devices, vehicles, as well as home appliances to a particular internet. This paper provides a comprehensive review of IOT applications across covering numerous sectors, including healthcare, smart homes, industrial automation, transportation, & agriculture. We discuss the benefits, challenges, and future directions of IoT applications, highlighting their potential to improve proficiently, productivity, & quality of life. The word 'Internet of Things (IOT) was invented in 1999 by the computer scientist Kevin Ashton.

Introduction

The term Internet of Things (IOT) assigns to the network of physical tools, home appliances, vehicles, and other items enclosed with detectors, software, and connectivity, allowing them to gather and share data. Internet of Things is the concept of connecting different devices to each other and transmit thousands of bits of data and information on the internet. In this paper, an overview of different platforms and applications andchallenges.The Internet of Things (IoT) represent that the network of devices

adequate of receiving and sharing the knowledge. These network tools use internet protocol (IP) to convey with each other. The online network of aggregate is an addition of IoT which includes people, procedure, information, security and objects in network connections.

Why are IoT solutions important?

IoT solutions are important because they:

- Enhance efficiency and automation in industries like manufacturing, healthcare, and agriculture
- Enable data-driven decision-making through connected device insights
- Improve user experiences in smart homes, cities, and wearable tech
- Drive innovation in areas like predictive maintenance and remote monitoring
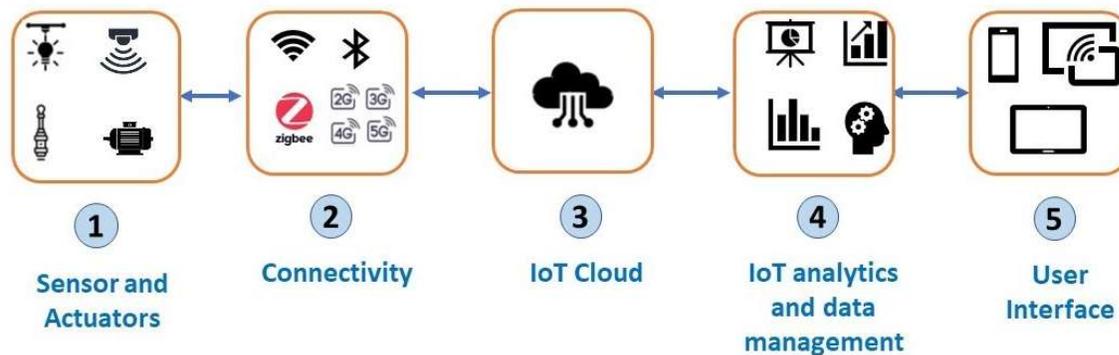
Components of IOT

Fig: 1 components of iot

Key components of IoT include:

1. **Sensors component**: Accumulate data from the environment, such as climate, humidity, or motion.

2. **Actuator component**: Perform actions based on data, for instance adjusting temperature or turning on a light.

3. **Microcontrollers:** Process data and control devices, often using low-power, low-cost processors.

4. **Communication Protocols:** Enable devices to communicate, for example Bluetooth, Wi-Fi ,cellular networks.

5. **Cloud Platforms:** Provide data repository, processing, and evaluation, for instance AWS IOT or Google Cloud (Component) IOT Core.

Introduction to Four Types of IoT

Fig: Types of IOT.

Consumer IoT: Consumer IoT is called CIOT.IT refers to personalized and wearable technology that connects to the web. These devices are often specified to as advanced gadgets and home devices. CIOT include smart watches, smart glasses, security cameras, trackers, smart home technologies like voice and text-controlled home ,smart light and switches appliances etc.

Industrial Internet of Things (IIOT): The IIOT is a framework of correlated tools in the industrial sector(IS). IIOT connects machines as well as devices in industries like, oil and gas, power generation , transportation, manufacturing and transmission, and mines.

IIOT applications include:

- Supply chain optimization
- Predictive servicing
- Quality regulation
- Asset trace

Commercial IoT: It's the network of connected peripheral and infrastructure that can transmit and exchange information with each other. Commercial IoT refers to the use for business and industrial settings to enhance operational productivity, decrease costs, and enhance customer experiences. It assign to device and infrastructure used outdoor of the home. Commercial iot used for Trading and healthcare informatics utilize commercial IoT for auditable data pathways and consumer management. Commercial

IoT can also automate security controls, door locks,Smart shelves, inventory management, and customer behavior tracking and other barriers to unauthorized access, which helps companies improve security.

Commercial IoT applications include:

- Smart buildings

- Energy management

- Inventory management

- Customer analytics

4. Infrastructure Iot: Infrastructure IoT refers to the use of Internet of Things (IoT) innovation to govern, monitor, and control critical infrastructure systems .Infrastructure IoT focuses on developing and maintaining smart cities and public infrastructure, including:

Transportation systems, Energy grids, Public safety

Infrastructure IoT applications include:

- Smart traffic management
- Intelligent energy grids
- Water leak detection
- Emergency response systems

IoT Applications

1. **Smart Home Application**

IoT allows the automation of home appliances, enhancing convenience, energy efficiency, lighting, and security systems, and safety.

2. Industrial Automation

Industrial Automation improves operational efficiency, productivity, and safety in production through predictive management, supply chain optimization and quality control.

3. Healthcare

IoT enables remote patient monitoring, personalized medicine, and healthcare analytics, improving patient outcomes and reducing healthcare costs.

4. Transportation

IoT optimizes traffic management, route planning, and logistics, reducing congestion, emissions, and transportation costs.

5. Agriculture

IoT enables precision farming, livestock monitoring, and crop management, improving agricultural productivity, efficiency, and sustainability.

Benefits of IoT Applications

1. **Optimized performance**: IoT Digitizes processes, decrease manual labor and increasing productivity.

2. **Enhance Decision Making:** IoT provides Data processing, enabling informed decision-making.

3. **Increased Safety:** IoT enables predictive maintenance, reducing the risk of accidents and equipment failures.

4. **Better Customer:** Experience: IoT enables personalized services, improving customer satisfaction and loyalty.

Security and Privacy

1. **Block chain-based Security:** Utilizing blockchain technology to ensure secure data transmission and storage in IoT networks.

2. Artificial Intelligence-powered Security: Using AI to Recognize and Reply to IoT security Intimidations in real-time.

3. Privacy-Preserving IoT: Developing IoT solutions that prioritize user privacy and data protection.

Challenges

1. Security and Privacy: IoT devices are Susceptible to cyber Strikes, compromising data Safety and privacy.

2. Interoperability: IoT devices from different manufacturers may not be compatible, hindering seamless communication.

3. Data Administration: IoT - Produces vast amounts of data, Involving efficient data management and Insights.

Future Directions

1. Integration with Emerging Technologies: IoT can benefit from integration with AI, block-chain, and other emerging technologies.

2. Edge Computing: Processing data closer to the source can reduce latency, improve real-time decision-making, and enhance security.

3. 5th Generation Networks: The adoption of 5th Generation networks will allow Quicker data transmit rates, lower latency, and greater Linkage.

4. Standardization: Establishing industry-wide standards for IoT devices and protocols will facilitate interoperability and scalability.

Conclusion

The internet and web applications have undergone significant evolution over the years, Redesigning the way we live, task, and Collaborate. As Innovation continues to advance, we can assume even more Creative and interactive web applications, enabling new opportunities and experiences.The IoT has transformed various industries, offering numerous benefits and opportunities. On the other hand, it also poses major complications, including security, interoperability, and scalability. By addressing these

challenges and exploring future directions, We have the ability to unlock the full prospect of the IoT and generate a more connected, efficient, and renewable world.

Reference

- A. Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications," IEEE Communications Surveys & Tutorials, no. 4, pp. 2347-2376, 2015.

- https://www.researchgate.net/publication/332414081_Overview_for_Internet_of Things_Basics_Components_and_Applications

- Lee, I., & Lee, K. (2015). The Internet of Things (IoT): Applications, investments, challenges for enterprises. Business Horizons, 58(4), 431-440.

- Home Security Systems.(n.d.).

- Home Security Systems. (n.d.). "HP News - HP Study Finds Alarming Vulnerabilities with Internet of Things (IoT)." Www.hp.com.

- J. Liu et al., "A Wearable Sensor-Based Fall Detection System for Elderly," IEEE Sensors Journal, vol. 16, no. 13, 2016.

- S. R. Islam et al., "The Internet of Things for Health Care: A Comprehensive Survey," IEEE Access, vol. 7, pp. 6567-6580, 2019.

- Eiman Al Nuaimi1 et al., Applications of big data to smart cities. Journal of Internet Services and Applications 2015.