

# Introduction of SOA and IoT in new Emerging Trends Technology

**Satendra Kumar Dwivedi<sup>1</sup>**(Email: [satendradwivedi16@gmail.com](mailto:satendradwivedi16@gmail.com))

**Kislay Kumar<sup>2</sup>**(Email: [kislaykum.000@gmail.com](mailto:kislaykum.000@gmail.com))

**Guddu**(Email : [rahulkumarprojects@gmail.com](mailto:rahulkumarprojects@gmail.com))

**N.K SHARMA<sup>4</sup>** (Email:[drnaveenkr101@gmail.com](mailto:drnaveenkr101@gmail.com))

Department Of MCA

IIMT College Of Engineering , Greater Noida.

## Abstract —

The Internet of Things (IoT) has revolutionized various industries, including healthcare, transportation, agriculture, and manufacturing. In the field of research, IoT technologies offer promising opportunities for data collection, analysis, and monitoring. This paper presents a comprehensive review of IoT applications in research, highlighting their benefits, challenges, and future prospects. The paper begins by introducing the concept of IoT and its underlying technologies, such as sensors, actuators, and connectivity protocols. It then delves into various domains where IoT has made significant contributions to the research landscape. These domains include environmental monitoring, smart cities, healthcare, agriculture, and scientific experiments.

## 1. INTRODUCTION:

The Internet of Things (IoT) is a networking of physical devices, home appliances, smart vehicles, home appliances, and other gadget that are attached with sensors, software, and network connectivity, enabling them to gather and exchange data. This data can be analysed and used to improve efficiency, enhance safety, and enable new services and applications. IoT has the ability to transform industries and impact various aspects of daily life, from transportation and healthcare to smart homes and cities.

The concept of IoT has been around for many years, but

advancements in technology have made it more practical and affordable to implement on a larger scale. The existence of low-cost sensors, wireless connectivity, and cloud computing have enabled devices to be connected and share data in real-time. This connectivity has the potential to create a seamless integration of physical and digital systems, which can be used to optimize processes and drive innovation.

While IoT offers numerous benefits, it also raises concerns about privacy, security, and data ownership. As IoT becomes more prevalent, it will be important for individuals, businesses, and governments to address these issues and establish guidelines and regulations to ensure that IoT devices are used in a responsible and ethical manner.

IoT devices can be found in a wide range of applications, from smart homes and cities to healthcare and industrial automation. They can be used to monitor and control devices and processes, gather and analyze data, and automate tasks, among other things.

With the growth of IoT, there are also concerns about security, privacy, and data governance that need to be addressed to ensure the safe and responsible use of this technology.

Overall, IoT represents a major shift in the way we interact with technology and the world around us, with the potential to create new opportunities for innovation, growth, and sustainability.

## 2. Concept of IoT:

The concept of IoT firstly given by **Kevin Ashton** in 1999, and he referred the IoT as uniquely identifiable connected objects with radio-frequency identification (RFID) technology. However, the exact definition of IoT is still in the forming process that is subject to the perspectives taken. IoT was generally defined as “dynamic global network infrastructure with self-configuring capabilities based on standards and communication protocols”.

The concept of IoT revolves around the idea of connecting devices and making them smarter and more efficient. This is achieved by enabling them to communicate and collaborate with each other, with people, and with other systems through the internet or other networks.

The data collected by these devices can be analyzed to provide insights and inform decision-making, leading to increased efficiency, productivity, and convenience. IoT has a wide range of applications, from smart homes and wearable devices to industrial automation and smart cities.

Overall, the goal of IoT is to improve the quality of life and reduce the workload of individuals, while also promoting sustainability and reducing waste.

The app is designed to be used in the middle where most of the

coding is done. Today, there are many types of middleware that management and reporting options. Moreover, empirical evidence also disclosed that student attendance records have become one of the primary determining factors academic performance of students and personal achievements. This

statement was confirmed by the previous one research where

can be used to build web applications, such as Hypertext Preprocessor (PHP) or Active Server Pages (ASP). In addition, a web server such as Internet Information Services (IIS) or Apache is required to access the system over the Internet. Web-based

systems are known for their time savings and data management

meaningful correlation has been demonstrated between the students' attendance record and their academic performances due to the process used to create the architecture. These applications can facilitate rapid response, rapid access to information, and most importantly, being able to support many B. Timing of Registration Applications Previous studies have shown that various web-based systems have been developed to assist with attendance information. For example, the Interactive Student Attendance Management System (ISAMS) was developed using barcode scanners to record student attendance [8]. Some of these methods are; can generate reports while processing and accessing user data such as students and teachers

in real time. Other projects include the East Japan School of Technology, which uses school systems to improve the use of barcode readers to record and report student attendance.

### 3. Advantages of IoT

The Internet of Things (IoT) offers several advantages across various domains and industries. Here are some of the key advantages of IoT:

1. **Connectivity and Data Exchange:** IoT enables the connection and data exchange between various physical devices and systems. This connectivity allows for seamless communication and integration between devices, leading to improved efficiency, automation, and decision-making.
2. **Increased Efficiency and Productivity:** IoT technologies can enhance operational efficiency and productivity by automating processes, optimizing resource allocation, and reducing human intervention. For example, smart manufacturing systems can streamline production lines, monitor equipment health, and optimize energy consumption.
3. **Cost Savings:** IoT can help organizations reduce costs through improved asset management, predictive maintenance, and energy optimization. By collecting and analyzing data from connected devices, businesses can identify inefficiencies, prevent equipment failures, and make data-driven decisions that optimize resource utilization and reduce operational expenses.
4. **Enhanced Customer Experience:** IoT enables personalized and interactive experiences for customers. Connected devices can gather data about customer preferences, behavior, and usage patterns, allowing businesses to offer tailored products and services. For instance, smart home devices can adjust lighting, temperature, and security settings based on user preferences.
5. **Improved Safety and Security:** IoT technologies can enhance safety and security in various domains. For instance, connected

### 4. Evolution of Internet

The internet has come a long way since its inception in the 1960s as a network for government and academic researchers to communicate and share information. Here is a brief overview of the evolution of the internet:

**ARPANET:** In 1969, the US Department of Defense's Advanced Research Projects Agency (ARPA) developed ARPANET, the precursor to the internet. ARPANET was a network of computers that allowed researchers to share data and communicate with each other.

**TCP/IP:** In the 1970s, the Transmission Control Protocol/Internet Protocol (TCP/IP) was developed, which allowed different computer networks to communicate with each other. TCP/IP became the foundation for the modern

internet.

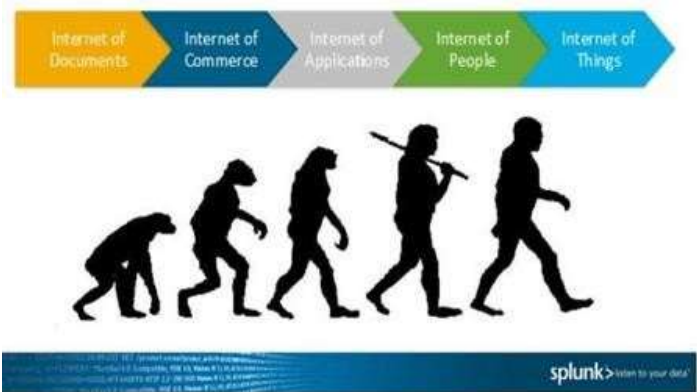
**World Wide Web:** In 1989, Tim Berners-Lee, a researcher at the European Organization for Nuclear Research (CERN), invented the World Wide Web, a system of hyperlinked documents that could be accessed through the internet.

**Commercialization:** In the 1990s, the internet became commercialized, with the development of web browsers, e-surveillance systems can monitor public spaces or critical infrastructure, while wearable devices can provide real-time health monitoring and emergency alerts. IoT also enables enhanced cybersecurity measures to protect data and devices from threats.

6. **Data-driven Insights and Decision-making:** The massive amount of data generated by IoT devices provides valuable insights that can drive informed decision-making. By analyzing this data, organizations can identify trends, patterns, and correlations, enabling them to make proactive decisions, optimize operations, and improve business strategies.
7. **Environmental Sustainability:** IoT can contribute to environmental sustainability by enabling efficient resource management. Smart grids can optimize energy distribution and reduce waste, while connected sensors can monitor environmental conditions and help prevent pollution. IoT solutions also support smart transportation systems, reducing traffic congestion and fuel consumption.
8. **Remote Monitoring and Control:** IoT allows for remote monitoring and control of devices and systems. This capability is particularly useful in sectors like healthcare, agriculture, and infrastructure management. For example, doctors can remotely monitor patients' health conditions, farmers can monitor crops and automate irrigation, and city managers can monitor and control streetlights.

It's important to note that while IoT offers numerous advantages, it also presents challenges related to security, privacy, and interoperability. Proper measures should be taken to address these concerns and ensure the responsible and secure implementation of IoT solutions.

commerce, and search engines. **Mobile internet:** In the 2000s, the internet became mobile with the advent of smartphones and mobile data networks.



Social media: In the late 2000s, social media platforms like Facebook, Twitter, and Instagram.

RCHITECTURE OF IOT

A critical requirement of an IoT is that the things in the network must be attached to each other. IoT system architecture must guarantee the operations of IoT and proper working, which connects the physical and the virtual worlds. Design of IoT architecture involves many compounds such as networking, communication, processes etc. during designing the architecture of IoT, the collaboration extensibility, scalability, and operability among devices should be taken

into consideration. With to the fact thatthings may move and need to interact with others in real-time mode, IoT architecture should be adaptive to make devices interact with other dynamically and support communication amongst them. Other than this, IoT should possess the decentralized and heterogeneous nature and should adaptive to all.

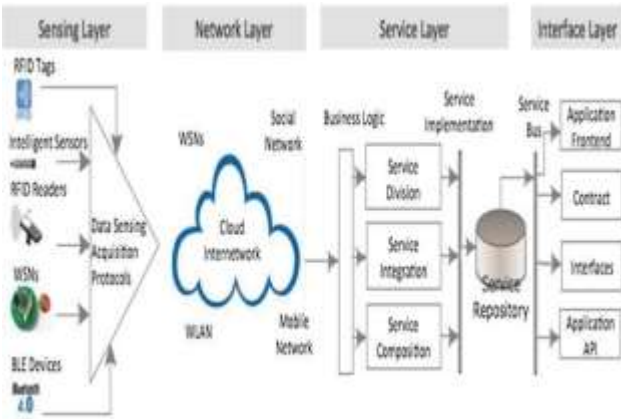
5. SERVICE ORIENTED ARCHITECTURE

The Service-Oriented Architecture (SOA) is an architectural approach that allows the creation of loosely coupled services that can be used to build applications. The Internet of Things (IoT) directed to the network of physical devices that are equipped with sensors, software, and other technologies to allow them to connect and exchange data. When combining SOA and IoT, it creates a powerful combination that allows for the creation of complex systems that can be easily integrated with other systems and

applications. In an SOA-based IoT system, each IoT device acts as a service that provides a specific function. These services canbe accessed by other devices or applications through APIs, making it easier to develop complex applications that utilize IoT devices.

SOA-based IoT systems have several advantages over traditional IoT systems, including:

- 1. **Scalability:** SOA-based IoT systems can be easily scaled up or down as needed, making it easier to handle large amounts of data and devices.
- 2. **Interoperability:** Since each IoT device acts as a service in an SOA-based system, it is easier to integrate with other systems and devices, regardless of the platform or technology.
- 3. **Flexibility:** SOA-based IoT systems are highly flexible, allowing developers to easily modify or add new services without affecting the overall system.
- 4. **Security:** SOA-based IoT systems can be designed with security in mind, with each service being secured and authenticated to ensure that only authorized users or devices can access it.



## 6. CONCLUSION

The Internet of Things (IoT) is a rapidly growing technology that has the potential to revolutionize the way we live, work, and interact with the world around us. By connecting devices, sensors, and systems to the internet, IoT enables organizations to collect vast amounts of data, which can be used to optimize operations, reduce costs, and improve efficiency.

IoT systems typically consist of several layers, including the sensing layer, the network layer, the service layer, and the interface layer. Each layer plays a critical role in the overall functionality of the system, from collecting data to analyzing it and providing feedback to users.

In conclusion, the potential benefits of IoT are significant, and its impact on our daily lives and the global economy is likely to be profound. However, realizing these benefits will require continued investment and innovation, as well as a focus on addressing the challenges associated with IoT deployment.

## REFERENCE

1. "The Internet of Things" by Samuel Greengard /Author: Samuel Greengard
2. "Learning Internet of Things" by Peter Waher / Author: Peter Waher
3. Oxford Dictionaries, Definition of "Internet of Things".  
[https://www.lexico.com/en/definition/internet\\_of\\_things](https://www.lexico.com/en/definition/internet_of_things)
4. IEEE Communication Society—IEEE Communication Magazine.
5. <https://www.javatpoint.com/iot-internet-of-things>
6. [https://www.tutorialspoint.com/internet\\_of\\_things/index.htm](https://www.tutorialspoint.com/internet_of_things/index.htm)
7. <https://www.guru99.com/iot-tutorial.html>
8. <https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/>